165-86

English

3071

1871

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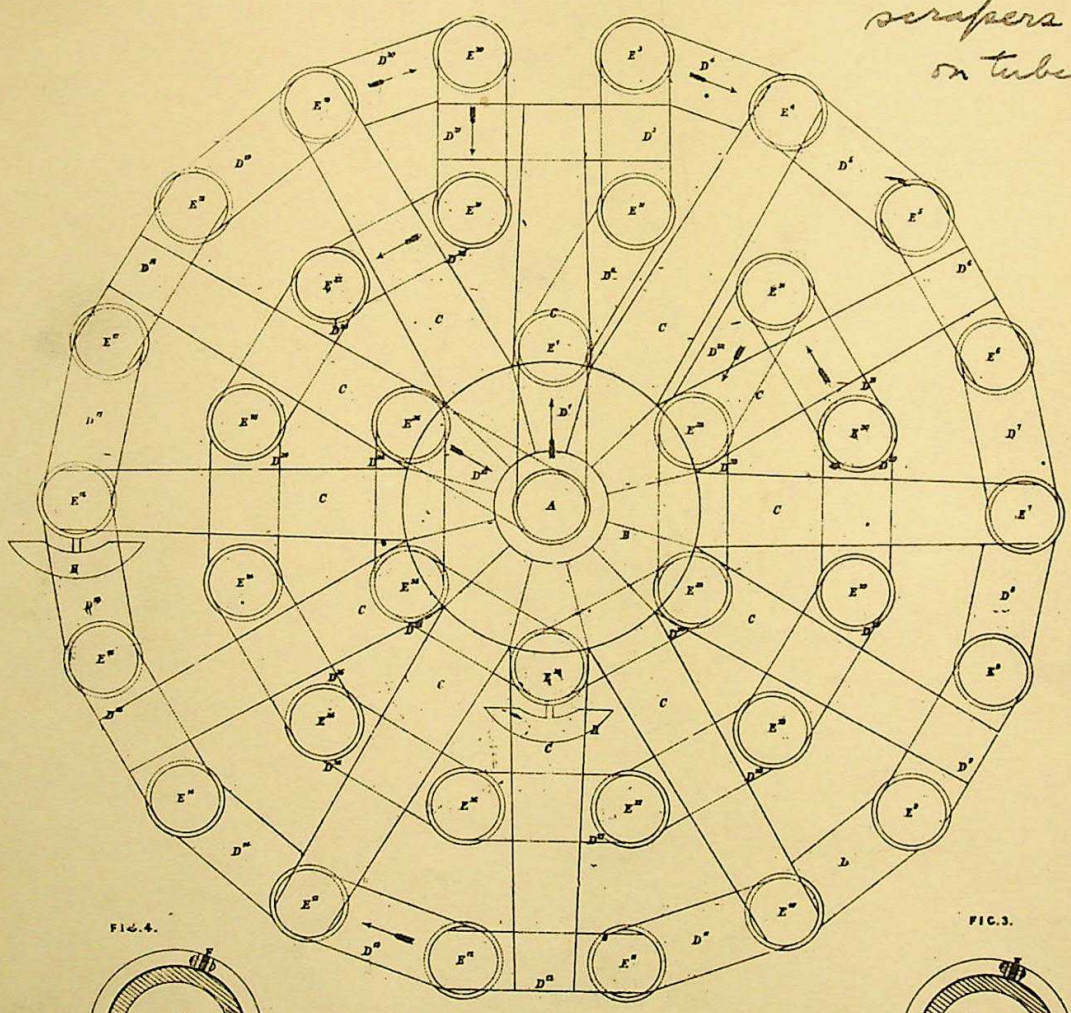
241.9

Horizontal rotary table

FIG. 1.

scrapers hung on tubes



A. DIETZ, Nov. 14, N.Y. 1871.
J. & T. H. MITCHELL'S Specifications

FIG. 4.

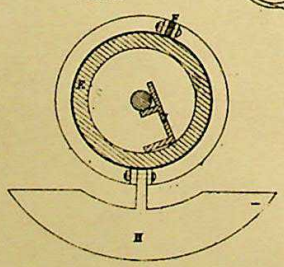


FIG. 3.

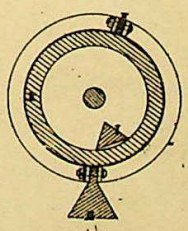


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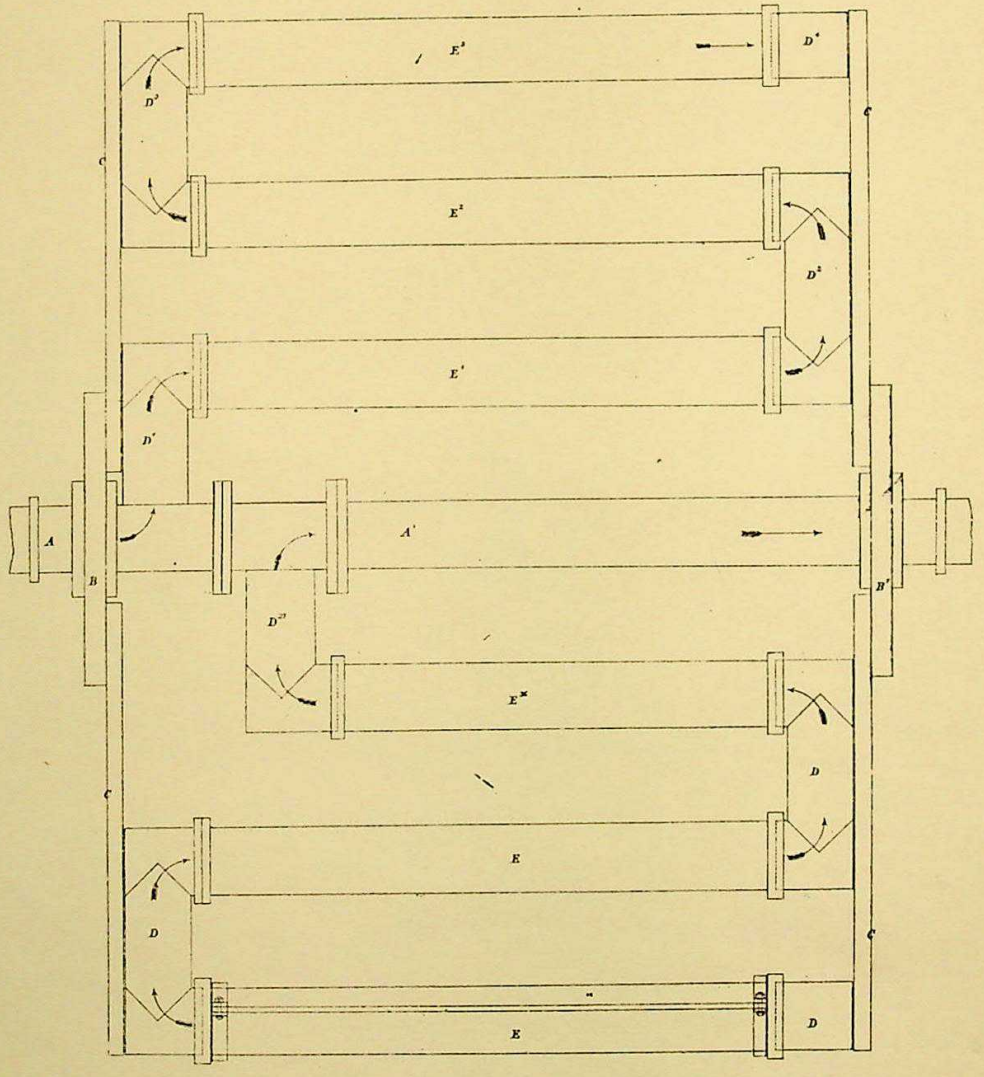
FIG. 2.



A.D. 1871, 14*th* NOVEMBER. N° 3071.

Utilizing Waste Heat from Furnaces.

LETTERS PATENT to John Mitchell, of Thurstonland, near Huddersfield, in the County of York, and John Hirst Mitchell, of the same Place, Millwrights and Machine Makers, for the Invention of "A NEW OR IMPROVED APPARATUS FOR UTILIZING THE WASTE HEAT FROM STEAM BOILER AND OTHER FURNACES, THEREBY ECONOMIZING FUEL."

Sealed the 30th April 1872, and dated the 14th November 1871.

PROVISIONAL SPECIFICATION left by the said John Mitchell and John Hirst Mitchell at the Office of the Commissioners of Patents, with their Petition, on the 14th November 1871.

We, JOHN MITCHELL, of Thurstonland, near Huddersfield, in the County of York, and JOHN HIRST MITCHELL, of the same Place, Millwrights and Machine Makers, do hereby declare the nature of the said Invention for "A NEW OR IMPROVED APPARATUS FOR UTILIZING THE WASTE HEAT FROM STEAM BOILER AND OTHER FURNACES, THEREBY ECONOMIZING FUEL," to be as follows:—

The object of this Invention is chiefly to heat the feed water supplied to steam boilers, but the apparatus may be employed for heating water

or other liquids or fluids to be applied to other purposes, and consists of an arrangement of straight pipes fitted together in a cylindrical form, connected at each end by means of a cast-iron disc bearers with suitable thoroughfares forming a communication from one pipe to another or connected by means of cast-iron elbow pipes of the same bore, the whole mounted upon arms attached to and rotates or revolves on a hollow axis.

Each straight pipe is fitted with a scraper, which is a thin iron bar extending from one end to the other with the edge resting on the outer surface. These scrapers are each held to and maintained upon the top or other sides of the pipes by means of weights attached thereto by loose clasps encircling and hanging down underneath the said pipes as they rotate or the cylindrical mass of pipes revolve, and which weights are bars of iron, by preference of triangular shape in cross section with the apex upward, to deflect the heat towards the pipes.

Each straight pipe is likewise provided with an inside scraper, which consists simply of an iron bar of angular shape laid loose in the inside of each pipe, which as the pipes rotate continually slides to the bottom and thereby rubs or scrapes the interior of each pipe, which prevents incrustation or substances adhering to the inner surface thereof.

Each joint is flanged and turned or planed accurately so as to be (with the use of a little cement) made perfectly water-tight.

The whole is fitted together securely and mounted on suitable bearings inside the flue betwixt the boiler furnace and chimney, with the axis in a horizontal position.

The action of the heat current from the boiler furnace flue towards the chimney on the outer surface of the pipes heats the water inside to a high temperature, varying according to the quantity of water passed through the pipes and the degree of heat in the flue.

The inlet and outlet pipes are connected to the revolving centres or axes by means of conical joints accurately fitted, and the outlet pipe is also fitted with a safety valve and the connecting pipes with necessary valves and taps.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said John Mitchell and John Hirst Mitchell in the Great Seal Patent Office on the 14th May 1872.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, JOHN MITCHELL, of Thurstonland, near Huddersfield, in the County of York, and JOHN HIRST MITCHELL, of the same Place, Millwrights and Machine Makers, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Fourteenth day of November, in the year of our Lord One thousand eight hundred and seventy-one, in the thirty-fifth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said John Mitchell and John Hirst Mitchell, Her special licence that we, the said John Mitchell and John Hirst Mitchell, our executors, administrators, and assigns, or such others as we, the said John Mitchell and John Hirst Mitchell, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "A NEW OR IMPROVED APPARATUS FOR UTILIZING THE WASTE HEAT FROM STEAM BOILER AND OTHER FURNACES, THEREBY ECONOMIZING FUEL," upon the condition (amongst others) that we, the said John Mitchell and John Hirst Mitchell, our executors or administrators, by an instrument in writing under our, or their, or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said John Mitchell and John Hirst Mitchell, do hereby declare the nature of our said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement and accompanying Sheets of Drawings (that is to say) :—

The object of this Invention is chiefly to heat the feed water supplied to steam boilers, but the apparatus may be employed for heating water

or other liquids or fluids to be applied to other purposes, and consists of an arrangement of straight pipes fitted together in a cylindrical form, connected at each end by means of two cast-iron disc bearers with suitable thoroughfares forming a communication from one pipe to another or connected by means of cast-iron elbow pipes of the same bore, the whole mounted upon arms attached to and rotates or revolves on a hollow axis.

Each straight pipe is fitted with a scraper, which is a thin iron bar extending from one end to the other with the edge resting on the outer surface. These scrapers are each held to and maintained upon the top or upper sides of the pipes by means of weights attached thereto by loose clasps encircling and hanging down underneath the said pipes as they rotate or the cylindrical mass of pipes revolve, and which weights are bars of iron, by preference of triangular shape in cross section with the apex upward, to deflect the heat toward the pipes.

Each straight pipe is likewise provided with an inside scraper, which consists simply of an iron bar of angular shape laid loose in the inside of each pipe, which as the pipes rotate continually slides to the bottom, and thereby rubs or scrapes the interior of each pipe, which prevents incrustation or substances adhering to the inner surface thereof.

Each joint is flanged and turned or planed accurately so as to be (with the use of a little cement) made perfectly water-tight.

The whole are fitted together securely and mounted on suitable bearings inside the flue betwixt the boiler furnace and chimney, with the axes in a horizontal position.

The action of the heat current from the boiler furnace flue toward the chimney on the outer surface of the pipes heats the water inside to a high temperature, varying according to the quantity of water passed through the pipes and the degree of heat in the flue.

The inlet and outlet pipes are connected to the revolving centres or axes by means of stuffing box conical joints accurately fitted, and the outlet pipe is also fitted with a safety valve and the connecting pipes with necessary valves and taps.

Such being the nature and object of our said Invention, we will now proceed to explain more fully the construction and arrangement by the

aid of Drawings annexed hereto, of which Fig. 1 is an end elevation and Fig. 2 is a plan view.

A is a hollow shaft composed of a series of flanged pipes with two discs B and B^1 fixed in between two of the joints to form bosses, to which are bolted a series of arms C, and to these arms are bolted a series of elbow pipes D, and a blank flange is also placed between another joint A^1 forming a division in the hollow shaft. These elbow pipes, which are attached to the arms fixed on the disc B, are connected by a series of straight pipes E to the elbow pipes attached to the arms fixed on the disc B^1, and the arrangement is such that a continuous passage is formed throughout the whole series or entire length of pipes, so that water (or other liquid or fluid) on being introduced at one end of the shaft or centre pipe A will pass into and through the elbow D^1 into and through the straight pipe E^1, thence through the elbow D^2 into and through the pipe E^2, thence through the elbow D^3 into the pipe E^3, and so on, alternately passing across from one end of the apparatus to the other according to the letters and figures marked on the Drawings, until finally arriving at the centre pipe or shaft A, but on the other side of the division flange A^1, when it passes out at the other end thereof A^2.

Each of the straight pipes is provided with a scraper F, see Fig. 3, which is a cross section of one of the pipes E connected by a strap G to a weight H, which being heavier than the scraper always keeps it (the scraper) on the upper side of the pipe, although each pipe rotates or turns over by reason of revolution of the series of pipes when in operation. Also each pipe E is provided in its interior with another scraper or bar I, which by its gravity is caused to slide over the inner surface as the pipe turns over. This apparatus is placed within the flue leading from the furnace of a steam boiler or other furnace to the chimney mounted on pedestals or bearings its shaft horizontal, and a slow rotary motion is given to it by worm and wheel or any other suitable means.

Fig. 4 is a modified form of scrapers and weight.

This machine or apparatus is compact but not complicated, having only one motion, a slow revolving one, the top side by preference always turning toward the boiler, which motion is communicated by a small shaft worm and wheel. The operation of the scrapers is natural and simple, it being almost impossible for them to get out of order, and the

rotary motion of the machine alternately presents to the heat current the whole of the outer surface of each pipe, thereby rendering the wear and tear (which is very small) uniform throughout.

Having thus described the nature of our said Invention, and shewn by Drawings in what manner the same is to be performed or put into practical operation, we would have it understood that we do not confine ourselves to the precise details in the construction or arrangement herein described and shewn, but we claim an arrangement of pipes and scrapers for the purpose set forth, capable of motion in manner substantially as shewn and described.

In witness whereof, I, the said John Hirst Mitchell, for and on behalf of myself and the said John Mitchell, have hereunto set my hand and seal, this Ninth day of May, in the year of our Lord One thousand eight hundred and seventy-two.

JOHN HIRST MITCHELL. (L.S.)

Witness,

JOSEPH STEAD,
Clerk to Tasker & Brierley,
Halifax & Bradford.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1872.